

Technology Opportunity

Storage of Cryogenic Liquids

The National Aeronautics and Space Administration (NASA) seeks to transfer a new cryogenic liquid storage concept that outperforms existing methods.

Potential Commercial Uses

- Hospitals and process plants that have on-site cryogenic storage requirements
- Over-the-road cryogenic dewar manufacturers
- Future manufacturers of storage tanks for planetary space missions

Benefits

- Fifty percent reduction in cryogenic fluid loss
- Smaller storage volume requirements

The Technology

The primary modes of heat input into cryogenic vacuum-jacketed storage dewars are radiation and solid conduction from the warm outer surface to the cryogen. NASA Lewis is developing a MultiLayer Insulation (MLI) system that greatly reduces heat transfer to the cryogen. The MLI system consists of many layers of a highly reflective metallized material separated by a spacer material. The dominate mode of heat transfer near the cold boundary was found to be solid conduction through the spacer material. This mode of heat transfer can be reduced by reducing the contact surface area and by increasing the conduction path (spacer thickness). The MLI system (fig.1) utilizes a unique matrix spacer concept that reduces the surface contact area, as compared with the presently used solid spacers, and also uses variable spacer thickness within the insulation to increase the conduction path near the cold boundary. An insulation system can be optimized either by varying the separator thickness for maximum effect for a fixed number of layers or by choosing the optimum number of layers for minimum heat leak within an overall thickness constraint. The superior performance of this concept has been demonstrated on a calorimeter at the NASA Lewis Research Center.

Options for Commercialization

Cryogenic Services, Inc., has applied for a patent; however, there is no limit on disclosure. Seeking partnership with an industry willing to use technology in non-aerospace applications.

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Key Words

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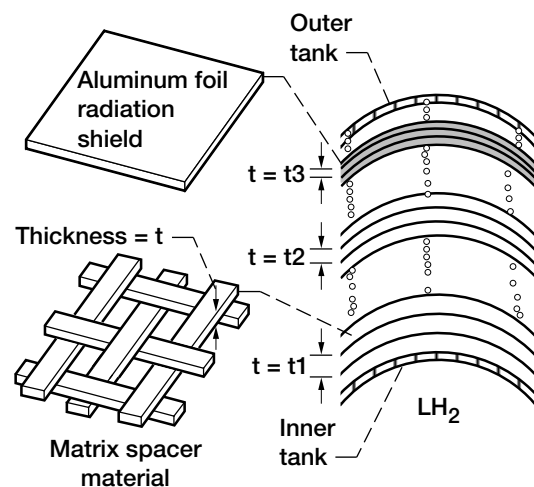


Figure 1.—Variable layer density concept.



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